CROSS CONNECTION CONTROL PROGRAM

OF UTAH

November 2003

Cross Connection Control Commission
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GUIDELINES - REFERENCE

A. Ordinance Guidance Document
B. List of Approved Backflow Prevention Assemblies/Devices
C. Approved Assembly Testing Methods
D. List of Acceptable Testing Equipment
E. Assembly Test Report Form

I. SCOPE

The scope of this document is to assist all public drinking water systems in the design, implementation and enforcement of a viable, ongoing cross connection control program which will ensure that both the water purveyor and the customer have exercised "reasonable diligence" in protecting the public drinking water.

A cross connection is defined as, "Any actual or potential connection between a potable water system and any other source or system through which it is possible to introduce into the public drinking water system any used water, industrial fluid, gas or substance other then the intended potable water." Cross connections and backflow incidences in the state of Utah have resulted in dangerous, highly contaminated water unexpectedly entering public drinking water systems. Irrigation waters, oil, toxic boiler compounds, sewage, pesticides, and other extremely dangerous contaminants have found their way into Utah public drinking water systems due to cross connections.

Millions of taxpayers dollars are spent every year to protect drinking water sources, systems, and treatment facilities, but even with all of the best infrastructure the integrity of the drinking water system and the quality of the water can be compromised by a single cross connection. One single cross connection can result in illness and, in an extreme case, death which could result in millions of dollars in court settlements as well as destroy the public's confidence of the public drinking water system.

Legal actions concerning pollution or contamination of public drinking water systems brought against water purveyors by consumers who have been affected by backflow incidences have reached astronomical financial proportions with the water purveyors often being found negligent in their methodology of protection or in the quality of the water they supply.

These legal proceedings, as well as federal law, state law, plumbing codes, rules and regulations, all mandate the specific needs for an on-going cross connection control program by all public drinking water systems serving the public whether publicly or privately owned.

There is a joint responsibility contract (whether verbal or written) that exist between the public drinking water system and the customer. This contract dictates that the water purveyor will provide a safe, adequate supply to the customer who in turn will maintain their privately owned plumbing system in compliance with local ordinances, requirements, codes and policies.

If this joint responsibility contract is enforced, it will protect both the public drinking water system and the private customer's responsibility and liability.

This type of program would enable the water purveyor to protect the quality of water in the distribution system thus exercising "reasonable diligence" for the protection of the safe drinking water supply.

II. DEFINITIONS

A. **Administrative Authority** shall mean the individual, official, board, department, or agency established and authorized by a state, county, city, or other political subdivision created by law to administer and enforce the provisions of the cross connection control program and/or the plumbing code.

B. **Backflow** shall mean the undesirable reversal of flow of water or mixtures of water and other liquids, gases, or other substances into the distribution pipes of the potable water supply from any source.

C. **Backpressure** shall mean the phenomena that occurs when the customer's pressure is higher than the supply pressure. This could be caused by an unprotected cross connection between a drinking water supply and a pressurized irrigation connection, a boiler, a pressurized industrial process, elevation differences, air or steam pressure, use of boosters pumps or any other source of pressure.

D. **Backsiphonage** shall mean a form of backflow due to a reduction in system pressure which causes a subatmospheric pressure to exist at a site in the water system.

E. **Certified Backflow Technician** shall mean an individual that has successfully completed a Division of Drinking Water approved backflow certification course with a written and practical examination, and has maintained this certification in accordance with R309-305, Certification Rules for Backflow Technicians.

F. **Consumer/Customer** shall mean the owner or operator of a privately or publicly owned plumbing system(s) having a service connection from the public drinking water system.

G. **Containment (Meter or Point of Connection Protection)** shall mean the practice of installing approved backflow prevention assemblies/devices at the service connection of consumers in order to protect the public drinking water system from any backflow from the consumers plumbing system.

H. **Contaminate** shall mean any substance introduced into the public drinking water system which creates a threat to the public health such as poisoning, pathogenic organisms or any other public health concern.

I. **Cross Connection** shall mean any actual or potential connection between a potable water system and any other source or system through which it is possible to introduce into the public drinking water system any used water, industrial fluid, gas or substance other then the intended potable water.

J. **Degree of Hazard** shall mean either a **pollutant (non-health)** or **contaminate (health)** hazard that may be introduced into the public drinking water system through a cross connection. Through an evaluation of the consumers plumbing system, the threat to public health (the degree of hazard) will be determined. In the past these terms have been referred to as high hazard for **health** and low hazard for **non-health**.

K. **Isolation (Plumbing Code Compliance)** shall mean the practice of installing approved backflow prevention assemblies/devices at each point of cross connection or system outlet as required by Plumbing Code as adopted by the State and its amendments.

L. **Pollutant** shall mean any substance introduced into the public drinking water system which does not create a threat to the public health but which does adversely and unreasonably affect the aesthetic quality of the water.

M. **Public Drinking Water System** shall mean a water system that is either publicly or privately owned, that provides water for human consumption and other domestic uses, which: has at least 15 service connections, and/or serves an average of at least 25 individuals at least 60 days out of the year.

N. **Service Connection** shall mean the terminal end of the public drinking water system where the water purveyor transfers jurisdiction and sanitary control of the water. If a water meter is present then the service connection exists at the downstream end of the meter.

O. **Water Purveyor** shall mean the public or private owner or responsible party of a public drinking water system.

III. AUTHORITY

A. Applicable Laws:

Federal Public Law 104-182, (the Safe Drinking Water Act and Amendments of 1996), identifies the responsibility of each public drinking water system to protect the quality of the water supplied to the consumers from any sources of contamination. As stated in the US EPA Cross Connection Control Manual, the water purveyor must provide a water that complies with all EPA standards at the source and deliver it to the customer without the quality being compromised as a result of it's delivery through the distribution system.

Utah Code, Section 19-4-112 (2d) states, "there shall be no cross connection between the potable (drinking water system) and nonpotable (auxiliary water supply) systems.

B. Regulations/Codes:

Utah Public Drinking Water Rules, Section R309-105-12 place the following requirement on public drinking water suppliers:

"The water supplier shall not allow a connection to his system which may jeopardize its quality and integrity. "In addition this rule identifies the need for a viable cross connection control program which includes an inventory of testable assemblies, testing and service records for the assemblies, testing frequency requirements and adherence to all requirements of Plumbing Code as adopted by the State and its amendments.

Occupation Safety and Health (OSHA) Rules and Regulations Part 1910-Subpart J, Section 1910.41, require that each employer furnish his or her employee(s) with an adequate safe drinking water supply. Thus inferring the need to protect against any backflow which would create an unsafe drinking water supply within the consumers distribution system as well as the public drinking water system.

The adopted Plumbing Code, requires that an approved backflow prevention/devices ~~to~~ be utilized.

The Division of Drinking Water shall maintain a list of backflow prevention devices and assemblies approved for containment use and applicable for use within the jurisdiction of the public water system.

C. Enforcement:

There are two tiers of enforcement responsibilities within a Cross Connection Control Program. The first tier is with the Utah Department of Environmental Quality, Division of Drinking Water where the Utah Public Drinking Water Rules apply to the public drinking water systems.

The second tier involves the public drinking water system's enforcement of a local ordinance, policy, or requirements applied to the customer.

TIER 1 Division of Drinking Water:

The enforcement methodologies associated with the Division of Drinking Water's application of the Public Drinking Water Rules vary from system to system, depending on the size and complexity of the situation. The usual enforcement means are:

1. A written Notice of Violation; issued by the Division of Drinking Water.

2. An Administrative Order; issued through the Utah Drinking Water Board wherein the public drinking water system is ORDERED to do certain things to come into compliance with the Utah Public Drinking Water Rules.

3. A Rating Change of the Drinking Water System. There are currently three ratings applied to public

drinking water systems:

a. APPROVED: This rating means that the water supplier is substantial in compliance with all drinking water rules.

b. CORRECTIVE ACTION: This rating reflects that some areas of deficiencies have been noted but the system is taking definite steps towards correcting these deficiencies.

c. NOT APPROVED: This rating identifies that the system is not in compliance with the drinking water rules and has been given ample opportunity to address certain noted deficiencies, and the system has failed to do so. This rating, when assigned, stops all federally insured home loans and many funding programs involving state and federal grants/loans. This sanction will remain in place until such time as the system adequately addresses the problems which caused this rating to be assigned.

TIER 2 Public Drinking Water System:

The second tier of enforcement involves methodologies which the public drinking water system applies to the customer. This is mandated and authorized by the adoption of some form of local authority (hereinafter referred to as ordinance)(see Appendix A - Ordinance Guidance Document). Within the ordinance, there should be provisions that: a) require protection on all cross connections; b) require periodic testing of all backflow prevention assemblies; c) require periodic hazard assessments; d) identify enforcement methods which should include discontinuation of water service to customer's that violate the ordinance; and e) identify who will administer the program. There could also be methodologies within the ordinance for service renewal fees, connection fees, inspection fees and/or a surcharge for maintenance of hazardous connections.

This type of enforcement (public drinking water systems enforcing their ordinances upon the customer) is legally viable, as long as there is a local ordinance in place that meets the basic criteria of the cross connection control program of the state.

IV. RESPONSIBILITIES

In the State of Utah, the authority and responsibility for the enforcement of an effective Cross Connection Control and Backflow Prevention Program lies both within the Department of Environmental Quality, Division of Drinking Water (DDW) and the Department of Commerce, Division of Occupational and Professional Licensing (DOPL).

The DOPL has the responsibility to ensure that all new plumbing is installed according to the Plumbing Code as adopted by the State of Utah. This responsibility includes that no installation of potable water supply piping or part thereof shall be made in such a manner that it will be possible for used, unclean, polluted, or contaminated water, mixtures, or substances to enter any portion of such piping and pose a threat to the integrity of the water contained within the potable water supply. Where such connections are required they shall be protected with the appropriate method of protection, installed in the proper application and in accordance with the appropriate installation criteria.

The DDW and each public drinking water system have the responsibility of protecting the quality and integrity of the drinking water contained within the public drinking water systems' distribution system. Due to the fact that private plumbing systems are in a constant state of change; which may or may not be installed by a licensed plumber or be inspected to ensure that the changes meet the adopted Plumbing Code requirements, the quality of the drinking water is the ultimate responsibility of each public drinking water system. In order to carry through with this responsibility, each public drinking water system is required to evaluate the backflow prevention issues specific to its distribution system and to implement a Cross Connection Control Program to prevent any type of backflow of this "used" water into the distribution system.

Because of this shared responsibility between the DDW and DOPL, an effective Cross Connection Control Program is one that involves both the water purveyor and the plumbing inspection official, as well as many other individuals involved in the backflow industry. The key individuals and their respective responsibilities are outlined in the following sections.

A. Utah Department of Environmental Quality, Division of Drinking Water, Drinking Water Board and Cross Connection Control Commission:

These government agencies are charged with the responsibility of promulgating and enforcing laws and rules to carry out an effective cross connection control program for the State of Utah.

The Utah Department of Environmental Quality, Division of Drinking Water has the primary responsibility of ensuring that water purveyors operate public drinking water systems in such a manner as to preserve and protect public health, including protecting the system from backflow.

The Drinking Water Board has the primary responsibility of promulgating and enforcing the Utah Public Drinking Water Rules that regulate public drinking water systems and the certification of backflow technicians.

The Cross Connection Control Commission has the responsibility of advising the Drinking Water Board as to the appropriateness of rules, regulations, codes, enforcement activities, etc., as they relate to cross connection control programs, policies and backflow prevention technician certification.

The Division of Drinking Water, as staff to the Cross Connection Control Commission and the Drinking Water Board, will work toward ensuring that each public drinking water system protects its distribution system from possible contamination.

In addition, each public drinking water system must work towards ensuring that the customer properly protects the quality and integrity of the drinking water contained within the private plumbing system as well as the public water distribution system.

Based on an evaluation of each individual water system by the system personnel, the protection may be accomplished by various methods (see Policy F, Containment versus Isolation).

1. **Public Drinking Water System**:

Under the Utah Public Drinking Water Rules (Section R309-105-12) the water purveyor has the primary responsibility for the prevention of any substance including water from any unapproved source, from entering the public drinking water system. The water purveyor has a responsibility to eliminate any situation where a water connection may jeopardize the quality of the drinking water within the public drinking water system. This may require discontinuance of water service for a customer who refuses to comply.

The public drinking water system is prohibited by these rules from installing or maintaining a water service connection to a consumer where a pollutant, plumbing or contamination hazard exist, unless the public drinking water system is protected against backflow by an approved backflow prevention assembly/device properly installed and maintained, as required by the adopted Plumbing Code.

The public drinking water systems' responsibilities include the source of supply, all of the public distribution system, the service lines and ends at the consumer's meter or property line. However, there may be activities that the customer engages in, that could jeopardize the quality of the drinking water if a backflow incident occurs. For this reason, the water purveyor must require, as a condition of service, to such customers, that the customer institute protection measures that may include: installation, maintenance, and periodic testing of approved backflow prevention assembly/devices. In addition, the water purveyor shall exercise "reasonable diligence" to ensure that not only the public drinking water system, but also the customer has taken the proper steps to protect the public drinking water system from possible contamination from whatever activities the customer engages in.

To ensure that the proper precautions are taken, the public drinking water system is required to determine the "degree of hazard" to the public drinking water system when the service connection is made; or in the case of an existing connection, a hazard assessment investigation or survey must be conducted to determine the "degree of hazard" within the existing site, as well as educating the customer

to the dangers of cross connections and their personal liability should a backflow event occur.

A hazard assessment is a detailed inspection of the customer facilities within the customer's plumbing system. This inspection would involve inspecting all water uses and piping within the system. If the customer refuses access to their facilities, the plumbing system must be classified as a high hazard connection and appropriate protection must be required at the service connection.
When it is determined that a backflow prevention assembly is required for the protection of the public drinking water system; the water purveyor shall require as a condition of water service:

a. Installation of a backflow assembly/device at each service connection (containment, meter protection) and/or recommend the appropriate protection be installed at each point of cross connection (isolation, plumbing code compliance) within the consumers water system.

Upon a requirement to install an assembly/device, the supplier must consider the degree of hazard AND the hydraulics of the customer's water system (thermal expansion, etc.) to ensure that the assembly/device is installed in accordance with its proper installation criteria and in the appropriate application.

b. Annual compliance inspection of the customer's water system, which may include the minimum annual testing of approved backflow prevention assemblies/devices.

c. Maintenance of records of each test and subsequent maintenance and repair, including materials or replacement parts used for approved backflow prevention assemblies/devices within their jurisdiction as well as records of hazard assessment investigation or surveys.

Copies of all backflow assembly test reports (reference Appendix E, Assembly Test Report) which are completed during the compliance inspection within the public drinking water system, will be maintained by the water purveyor and be available for inspection by the Division of Drinking Water staff or their designees (R309-101-4.3 and R309-105-12) during sanitary surveys. The customer and the Certified Backflow Technician should also retain copies of the test results for their files for five years.

Each public drinking water system must adopt some form of local authority or ordinance (See Appendix A, Ordinance Guidance Document). Within the ordinance, there should be provisions that: a) require protection on all cross connections; b) require periodic testing of all backflow prevention assemblies; c) require periodic hazard assessments; d) identify enforcement methods which should include discontinuation of water service to customer's that violate the ordinance; and e) identify who will administer the program. The ordinance should also address the methodology of protection (See Policy F, Containment versus Isolation Requirement) and technology.

The public drinking water system shall also design and implement a general public awareness and education program so that their customers will be apprised of the dangers of cross connections. The customers must be informed of the hazards associated with common activities that they, themselves, may impose on the public drinking water system.
The public drinking water system should look towards protection of all public facilities (golf courses, cemeteries, libraries, parks, public buildings, etc.) prior to full implementation of a cross connection control program on the customers of the public drinking water system.

WHEN A BACKFLOW OR SUSPECTED BACKFLOW INCIDENT OCCURS, THE DIVISION OF DRINKING WATER SHALL BE NOTIFIED IMMEDIATELY AT 536-4200 (OR 536-4123 AFTER HOURS), AND WATER SAMPLES SUFFICIENT TO DETERMINE THE DEGREE AND EXTENT OF CONTAMINATION MUST BE DRAWN FOR ANALYSIS.

2. **Certified Backflow Technician**:

When employed by a public drinking water system or by a customer to test, repair and/or maintain any backflow prevention assembly, the Certified Backflow Technician will have the following responsibilities:

a. Ensure that acceptable procedures are used for testing, repairing and maintaining any backflow prevention assembly (See Appendix C, Approved Assembly Testing Methods).

b. Make reports of such testing and/or repair to the customer and the public drinking water system, on forms approved for use by the Cross Connection Control Commission (Reference Appendix E, Test Report Form).

c. Include on report a list of any materials or replacement parts used to effect a repair or perform maintenance of that assembly.

d. Ensure that any replacement parts are equal in quality to parts originally supplied within the assembly and that they are supplied only by the manufacturer or their agent.

e. Avoid changing the design, material, or operational characteristics of the assembly during any repair or maintenance.

f. Perform test and be responsible for the competency and accuracy of all testing and reports thereof.

g. Ensure the status of technician's certification is current.

h. Be equipped with and competent in the use of all tools, gauges, and equipment necessary to properly test, repair, and/or maintain a backflow prevention assembly.

Failure to report a failing assembly to the public drinking water supplier which supplies water to the premises protected by that particular assembly within five (5) working days may be grounds for revocation of a backflow technicians' certification.
Any commercially available Class II or III Certified Backflow Technician is authorized to test any backflow prevention assembly at the invitation of the owner, and to report the results of that test to the owner and the water purveyor. However any repairs on backflow prevention assemblies which did not pass a test conducted by a Certified Backflow Technician, must be performed by a tester having appropriate licensure from the Department of Commerce, Division of Professional Licensing who also holds a current Class II or III Backflow Technician Certificate or by an "agent of the owner" of the assembly.

3. **Hazard Assessment Official**:

This official can be anyone whom the local jurisdiction has authorized and delegated to perform compliance and/or hazard assessment inspections or surveys and who should also hold a Class I, or III Utah Backflow Technician Certificate.

This individual shall conduct hazard assessments to determine the "degree of hazard" to the public drinking water system from an individual service connection (new or existing). In the case of an existing connection, a hazard assessment investigation or survey must be conducted to determine the "degree of hazard" within the existing site, as well as educating the customer to the dangers of cross connections and their personal liability should a backflow event occur. A hazard assessment is a detailed inspection of the customer facilities within the service connection. This inspection would involve inspecting all water uses and piping within the connection. If the customer refuses access to their facilities, the service connection must be classified as a high hazard connection and appropriate protection must be required at the service connection.

B. Utah Department of Commerce, Division of Occupational and Professional Licensing, Uniform Building Code Commission, Plumbing Advisory Committee, Plumbers Licensing Board, Building Inspector Licensing Board:

These government agencies are charged with the responsibility of promulgating and enforcing laws, rules, regulations, policies and carrying out an effective and standardized statewide plumbing code, and the

licensing of plumbers and plumbing inspectors.

The Utah Department of Commerce, Division of Occupational and Professional Licensing has the responsibility of ensuring that the plumbers and plumbing inspectors licensed under their authority have met all the training and educational requirements promulgated by the Plumbers Licensing Board and the Building Inspector Licensing Board.

The Plumbing Advisory Committee has the responsibility of advising the Uniform Building Code Commission as to the appropriateness of rules, regulations, codes, enforcement activities, etc., as they relate to the plumbing code adopted by the State.

1. **Plumbing Inspection Official**:
Plumbing inspection plays a key role in any political jurisdiction. Plumbing inspection departments have the responsibility to not only review building plans and inspect plumbing as it is installed, but the inspector also has the explicit responsibility of preventing any unprotected cross connections from being designed and built into any structures within their jurisdiction.

Where the review of any building plans suggest or detects potential for a cross connection being made an integral part of the potable water system, the plumbing official must REQUIRE such cross connection be either eliminated or be provided with an approved backflow prevention assembly/device in accordance with the adopted Plumbing Code.

In requiring a device or assembly, the plumbing official must determine the degree of hazard presented to the potable water system AND the hydraulics of the customer's water system (thermal expansion protection, etc.), to ensure the proper assembly/device is installed in accordance to its proper installation criteria.

The local plumbing official's responsibility begins at the point of service, (the downstream side of the meter or property line) and carries throughout the entire length of the customers drinking water system.

The plumbing official will inquire about the intended use of the potable water at any point where it is suspected that a cross connection may be made or where one is actually designed by the plans. When such a cross connection (actual or potential) is discovered, the plumbing official shall require that an approved backflow prevention assembly/device be installed in accordance with the adopted Plumbing Code.

2. **Licensed Plumber**:

The licensed plumber has the responsibility to ensure that all his work is installed in accordance with the adopted plumbing code.

C. Customer:

The public water system customer has the primary responsibility of maintaining his private plumbing system in compliance with the current plumbing code.

The customer may be required to bear the responsibility and expense of installing, maintaining and inspecting all high hazard air gaps, atmospheric vacuum breakers, hose bib vacuum breakers, and the testing, repairing and maintenance of all approved pressure vacuum breakers, double check valves assemblies, dual check valve devices, and reduced pressure zone backflow prevention assemblies within his jurisdiction.

V. STANDARDS

A. Cross Connection Control and Backflow Prevention Programs:

Every public drinking water system in the State of Utah is required to have a cross connection control program in place as stated in the Utah Public Drinking Water Rules section R309-105-12. A cross connection control program consist of a number of components which when properly administrated are designed to

prevent contamination from entering the public drinking water distribution system.

The main components of an effective cross connection control program are: local authority; public awareness; trained staff; record keeping; and on going enforcement. These components are the standard against which the public drinking water system's cross connection control and backflow prevention program will be measured.

1. **Local Authority:**

This would consist of an ordinance, bylaw, or some other type of legal provision established by the council, board, or governing legal body, that would authorize the public drinking water system to carry out a cross connection control program. Specific items to be covered in this ordinance would include:

a. Requirements for protection of all cross connections;

b. Requirements for periodic testing of assemblies and/or devices;

c. Requirements for periodic hazard assessment investigations or surveys;

d. Identify enforcement methods including authority to discontinue service to connections that refuse to comply; and

e. Identify responsible party for administering program and enforcement.

2. **Public Awareness and Education:**

A good public awareness program will provide information to the public concerning:

a. What cross connections are;

b. How they can be prevented;

c. What types of protection are available; and

d. The concerns associated with thermal expansion where protection is required.

In addition, a good public awareness program will target more than the public drinking water system customers, it will directly address other groups or individuals needed to insure that the cross connection control program will be successful in the community. For example, presentations can be made to plumbing supply stores, school districts, and civic groups.

3. **Trained or Certified Staff:**

It is recommended but not required that at least one member of the public drinking water system's staff be trained and certified as a backflow technician. It is, however, imperative though that a least one member of the system's staff have adequate training in cross connection control.

This training is being made available to managers and operators throughout the State through organizations such as the Rural Water Association of Utah, Intermountain Section of the American Water Works Association, Rural Community Assistance Corporation and the Utah Chapter of the American Backflow Prevention Association. Division of Drinking Water staff are also available to provide training in the area of cross connection control.

4. **Record Keeping:**

Once a public drinking water system has an ordinance and has established a cross connection control program, an efficient and detailed record keeping process must be established and maintained. Records should be made and kept concerning the following:

a. All surveys or inspections;

b. Inventory and locations of assemblies and high hazard air gaps;

c. Test histories and inspection records of the inventoried sites;

d. Any backflow incidents;

e. All corrective actions taken; and

f. All compliance and enforcement actions.

5. **On-going Enforcement Program:**

The program will only be as effective as the individuals who are authorized to carry it out. Ideally this would extend to the building inspection and or plumbing inspection departments where possible; but as a minimum someone in the water department shall be authorized to administer the program and take the necessary compliance actions.

Testing of backflow prevention assemblies may be done by public drinking water system personnel or by commercially available certified backflow technicians as required by the water purveyor. Hazard assessment investigations or surveys should be done by public drinking water system personnel, however, they may be preformed by commercially available certified backflow technicians as allowed by the water purveyor.

It is the combination of all the components that protect the safety and health of the water consumers as well as lower the water system's legal liability. If only one or two of the components are addressed then the system may actually be increasing its vulnerability.

B. Certification of Backflow Technicians:

The authority to certify backflow technicians (all three Classes) is found in the Utah Code, Section 19-4-104 (4a). Rules concerning the certification of the three Classes of backflow technicians have been written and adopted by the Cross Connection Control Commission and adopted by the Utah Drinking Water Board (R309 305).

Each Certified Backflow Technician will be issued a five digit certification number through the Division of Drinking Water. All test reports will have this five digit number in the appropriate areas of the test form.

The Division of Drinking Water will maintain a list of all certified technicians and those certified Class II and III technicians who are available for commercial testing.

C. Degree of Hazard:

For cross connection control and backflow prevention, there will be two "degrees of hazard". These degrees of hazard may also be found in the Uniform Plumbing Code.

The definitions of the two "degrees of hazard" are:

1. **Low or non-health hazard**: Pollutants, aesthetic (color, odor, taste, appearance) no health effects if consumed.

2. **High or health hazard**: Contaminants, any toxic substances or pathogens that may cause illness or death if consumed.

In determining the Degree of Hazard, the health impact to young children, the elderly and the immunocompromised, or any other health-compromised population must be taken into account. If the water

purveyor is in need of assistance in determining the degree of hazard that a particular service connection or cross connection is presenting to the public drinking water system the Division of Drinking Water should be contacted for assistance.

D. Types of Backflow:

Independent of the "Degree of Hazard" determination, there are two causes or "types" of backflow. They are:

1. **Backsiphonage**: This phenomena occurs when the supply pressure is reduced to 0 psi or below, which may cause a vacuum within the water supply system. This could be a result of high usage demand, fire flows, line breaks, or turning off the main supply for maintenance and repair.

2. **Backpressure**: This phenomena occurs when the customer's pressure is higher than the supply pressure. This could be caused by a cross connection between a drinking water supply and a pressurized irrigation connection, a boiler, a pressurized industrial process, elevation differences, air or steam pressure, use of boosters pumps or any other source of pressure.

E. Methods of Protection:

The appropriate method of backflow protection to be utilized will be based on the degree of hazard, the type of backflow conditions present, as well as the specific installation criteria for each method of backflow protection (See Section V, F-Assembly Installation Criteria).

Degree of Hazard	Type of Backflow	Approved Method of Protection
High or Low	Backsiphonage & Backpressure	Air Gap
High or Low	Backsiphonage & Backpressure	Reduced Pressure Zone Backflow Prevention Assembly (RP)
High or Low	Backsiphonage **ONLY**	Pressure Vacuum Breaker (PVB)
High or Low	Backsiphonage **ONLY**	Spill-Resistant Vacuum Breaker (SVB)
High or Low	Backsiphonage **ONLY**	Atmospheric Vacuum Breaker (AVB)
Low	Backsiphonage & Backpressure	Double Check Valve Assembly (DC)
Low	Backsiphonage **ONLY**	Hose Bibb Vacuum Breaker (HBVB)
*Low	Backsiphonage **ONLY**	Dual Check Device

*For Non-Industrial meter box installation only. Installation of these devices as well as any other backflow prevention assembly/device will create a closed water system which may result in thermal expansion in the customers internal water system. Written notification of installation is required (see Policy A, Non-Industrial Connection Protection).

Backflow prevention assemblies/devices shall be provided at any installation as required by the public drinking water system, the Division of Drinking Water, and as required by the adopted Plumbing Code.

F. Assembly Installation Criteria:

Backflow prevention assembly/device installation criteria can also be found in the adopted Plumbing Code.

Backflow prevention assemblies/devices shall be installed to provide at least the degree of protection as

dictated by the adopted Plumbing Code.

Prior to the installation of any backflow prevention assembly or device, the owner of the system must be notified that the installation of a backflow prevention assembly/device may create a closed system which could result in a thermal expansion hazard. Under such circumstances, the water system must inform the customer adequately and to the point that the customer understands and assumes responsibility for that phenomenon.

In order to ensure smooth flow characteristics entering and exiting any backflow prevention assembly or device, the approved assembly and/or device will be of an equal line size as to the incoming and outgoing water service line (See Section VI, Policy E-Line Sizing).

Prior to installation, all backflow prevention assemblies/devices, installed under the jurisdiction of the public drinking water system, must appear on the approved list as maintained by the Utah Department of Environmental Quality, Division of Drinking Water, (See Appendix B, List of Approved Backflow Prevention Assemblies/Devices). If any backflow prevention assembly/device which has not been approved is found in use as a primary backflow preventor within the direct jurisdiction of the public drinking water system, that assembly/device must be removed and replaced with a state approved assembly/device.

If an existing backflow prevention assembly is found in operation that at the time of initial installation was on the "approved" list, but is no longer listed, that assembly may remain in operation as long as it passes the required testing. When the assembly can no longer pass the required test, it must be removed from service and be replaced by an approved assembly of an equal or greater degree of protection.

Backflow prevention assemblies and devices must be installed within the following installation criteria:

1. **Air Gap**: Air gap means a physical separation between the discharge end of a drinking water supply pipe and a receiving vessel.

    a. The air gap shall be one inch, or twice (2x) the diameter of the incoming pipe (measured within 10 pipe diameters of the termination of the line), WHICHEVER IS GREATER. This measurement will be taken from the end of the water line to the flood rim of the receptacle or vat (the overflow or drain line will not be construed as the flood rim level).

    b. Where the air gap is within two (2) pipe diameters (horizontal measurement) of a wall or vertical surface, the air gap shall be increased to a minimum of 1.5 inches or to three (3x) times the incoming pipe diameter, WHICHEVER IS GREATER.

    c. In any high hazard installation the air gap will be inspected after initial installation and at least annually thereafter by a Certified Backflow Technician.

2. **Reduced Pressure Principle (RP) Backflow Prevention Assembly**:

    An RP assembly consists of two (2) independently acting internally loaded check valves, together with a hydraulically operated mechanically independent pressure differential relief valve located between the check valves and below the first check valve, four (4) properly located test cocks and two (2) tightly closing shut off valves.

    An RP assembly may be used to protect against a high (health) hazard or low (non health) hazard and against backsiphonage and/or backpressure type backflows.

    a. The assembly shall be protected from freezing and vandalism where applicable.

    b. The bottom of the RP assembly shall be a minimum of 12 inches above the ground or floor. The assembly owner, when necessary, shall provide devices or structures to facilitate testing, repair, and/or maintenance and to insure the safety of the backflow technician.

    c. The body of the RP assembly shall not be closer than 12 inches to any wall, ceiling, or

obstacle, and shall be readily accessible for testing, repair and/or maintenance

d. RP assemblies shall NOT be installed in a pit.

e. The relief valve on the RP assembly shall not be directly connected to any waste disposal line, including sanitary sewer, storm drains, or vents.

f. RP assemblies shall be maintained as an intact assembly.

g. The assembly shall be installed in a horizontal position only unless it appears on the Division of Drinking Water Approved Assembly List approved for installation in a vertical orientation.

3. **Double Check Valve (DC) Assembly**:

A DC assembly consists of two (2) independently operating internally loaded check valves, two (2) tightly closing shutoff valves, and four (4) appropriately located test cocks.

A DC assembly may be used to protect against low (non health) hazards only and backsiphonage and/or backpressure backflow conditions.

a. The bottom of the DC assembly shall be a minimum of 12 inches above the ground or floor. The assembly owner, when necessary, shall provide devices or structures to facilitate testing, repair and/or maintenance and to insure the safety of the backflow technician.

b. The body of the DC assembly shall be a minimum of 12 inches from any walls, ceilings, or obstacle and shall be readily accessible for testing, repair and maintenance.

c. If installed in a pit, the DC assembly shall be installed with a minimum of 12 inches of clearance between all sides of the vault including the floor and roof or ceiling with adequate room for testing and maintenance.

d. The DC assembly shall be maintained as an intact assembly.

e. The DC assembly shall be installed in a horizontal position only unless it appear on the Approved List for installation in the vertical position.

f. The assembly shall be protected from freezing and vandalism where applicable.

4. **Pressure Vacuum Breaker (PVB) Backsiphonage Prevention Assembly**:

A PVB assembly consists of a internally loaded check valve, an internally loaded air inlet valve (poppet) located on the discharge side of the check valve, two (2) tightly closing shut off valves, and two (2) appropriately located test cocks.

A PVB assembly may be used to protect against high (health) hazard or low (non health) hazards, backsiphonage backflow conditions only.

The PVB assembly may be subjected to continuous pressure.

a. The PVB assembly shall not be installed in an area that could be subjected to backpressure or back drainage conditions.

b. The PVB assembly shall be installed a minimum of 12 inches above all downstream piping and the highest point of use.

c. The PVB assembly shall be readily accessible for testing, repair and/or maintenance.

d. The PVB assembly shall not be installed below ground or in a vault or pit.

e. The PVB assembly shall be maintained as an intact assembly.

f. The PVB assembly shall be installed in a vertical position only.
g. The assembly shall be protected from freezing and vandalism where applicable.

5. **Spill-Resistant Pressure Vacuum Breaker (SVB) Backsiphonage Prevention Assembly**:

A SVB assembly consists of a internally loaded check valve, an internally loaded air inlet valve (poppet) located on the discharge side of the check valve, two (2) tightly closing shut off valves, and one (1) appropriately located test cock and one (1) appropriately located bleed/vent valve.

A SVB assembly may be used to protect against high (health) hazard or low (non health) hazards, backsiphonage backflow conditions only.

The SVB assembly may be subjected to continuous pressure.

a. The SVB assembly shall not be installed in an area that could be subjected to backpressure or back drainage conditions.

b. The SVB assembly shall be installed a minimum of 12 inches above all downstream piping and the highest point of use.

c. The SVB assembly shall be readily accessible for testing, repair and/or maintenance.

d. The SVB assembly shall not be installed below ground or in a vault or pit.

e. The SVB assembly shall be maintained as an intact assembly.

f. The SVB assembly shall be installed in a vertical position only.

g. The assembly shall be protected from freezing and vandalism where applicable.

6. **Atmospheric Vacuum Breaker (AVB)**:

An AVB device consists of an air inlet valve (poppet), a check seat and an air inlet port. There are no shut-off valves or test cocks on this type of device.

An AVB may be used to protect against high (health) or low (non health) hazards, backsiphonage backflow conditions only.

a. The AVB shall not be installed in an area that could be subjected to backpressure or back drainage conditions.

b. The AVB shall not be installed where it may be subjected to continuous pressure for more than 12 consecutive hours at any time.

c. The AVB shall be installed a minimum of six (6) inches above all downstream piping and the highest point of use.

d. The AVB shall be installed on the discharge (downstream) side of any valves.

e. The AVB shall be installed in a vertical position only.

f. The assembly shall be protected from freezing and vandalism where applicable.

7. **Hose Bib Vacuum Breaker**:

A Hose Bib Vacuum Breaker device consists of a single internally loaded check valve, atmospheric

vents around the device, and an anti-removal device (breakaway set screw, spring threads, etc.).

A Hose Bib Vacuum Breaker may be used to protect against low (non health) hazards only, backsiphonage backflow conditions only.

a. The Hose Bib Vacuum Breaker shall be installed with the anti-removal locking device engaged.

8. **Dual Check Valve Device**:

An approved Dual Check Valve device consists of two (2) independently operating, spring loaded check valves.

A Dual Check Valve device may be installed, as a secondary protection method of the drinking water system, within the meter yolk of non-industrial, low hazard connections. All other points of cross connection would then require the isolation method of protection (i. e., sprinkling system, home boiler, etc.).

G. Approved List for Backflow Prevention Assemblies\Devices:

To gain Division of Drinking Water approval for use within a public drinking water system, all backflow prevention assemblies must be in-line serviceable (repairable), in-line testable and have certification through third party certifying agencies. The third party certification will consist of any combination of two laboratory or field test certifications. Acceptable third party laboratory certifying agencies are; ASSE (American Society of Sanitary Engineers), IAPMO (International Association of Plumbing/Mechanical Officials), and the University of Southern California - Foundation for Cross Connection Control and Hydraulic Research (USC-FCCCHR). The USC-FCCCHR currently provides the only field testing of backflow protection assemblies.

All backflow prevention devices must have third party certification as mentioned above.

H. Assembly Testing Frequency:

The adopted Plumbing Code, states that "The premise owner or his designee shall have backflow prevention assemblies operation tested at the time of installation, repair, and relocation and at least on an annual basis thereafter, or more frequently as required by the authority having jurisdiction. Testing shall be performed by a Certified Backflow Prevention Assembly Tester."

The Division of Drinking Water has interpreted that code to reflect the initial test to be conducted within ten (10) days of initial usage rather than installation, due to the fact that some installations are not used for up to a full year after the initial installation, wherein an initial test would be meaningless. However, the required "annual" test must be conducted every year after the initial test or more often as determined by the Administrative Authority.

The Utah Public Drinking Water Rules, Section R309-105-12 specifically requires the annual inspection of all high hazard air gaps, and annual testing of reduced pressure principle assemblies, double check valve assemblies, pressure vacuum breaker assemblies, and spill- resistant vacuum breakers using methods acceptable to the Division of Drinking Water (See Appendix C, Approved Assembly Testing Methods), on test report forms that have been approved by the Division (Reference Appendix E, Assembly Test Report Form).

Dual check valve devices that have been installed as a secondary protection should be tested regularly. The Division of Drinking Water recommends testing 10% (random selection) of the installed devices annually.

I. Assembly Repair:

Any certified Class II or III Backflow Technician, may inspect and test backflow prevention assemblies.

Should a backflow prevention assembly be in need of repair, the ONLY individuals authorized to repair an

assembly are those having appropriate licensure from the Department of Commerce, Division of Professional Licensing with a Backflow Technician Certification (Class II or III), or an agent of the owner.

An "agent of the owner" is defined as a person working for the owner of the assembly/device and whose job description or normal duties authorize that person to affect repairs within the customers' plumbing system. A commercially available Certified Backflow Technician who inspects and tests backflow prevention assemblies or devices under contract with the owner, is not considered to be an "agent of the owner".

The drinking water system and the consumer both have the option of hiring and maintaining a Certified Backflow Technician within their organization as a permanent member of their staff or having an existing member of their staff become certified, or contracting with a commercially available Certified Backflow Technician to perform inspections and test within their Cross Connection Control Program.

The repair parts used in the repair of an assembly or device shall be equal to the manufacturers originally supplied parts and be authorized by the manufacturer of that particular assembly or device. Should unauthorized repair parts be used within a backflow prevention assembly/device, the person responsible for that repair could be held liable in the case of that assembly or device not passing the subsequent testing sequence, or should a backflow incident occur through that particular assembly or device. This could include criminal as well as civil liability.

J. Assembly Test Reports:

As specified in Section V Standards, Item H, Assembly Testing Frequency, it was noted that all reduced pressure principle assemblies (RPs), double check valve assemblies (DC), pressure vacuum breakers (PVB), and spill-resistant vacuum breakers, are required to be tested within ten (10) days of initial use and annually there after on test reports approved for use by the Division of Drinking Water. A copy of an approved test report form is found in Appendix E, Test Report Form.

Through the backflow technician certification process, every certified backflow technician has been exposed to these test report forms and should be aware of the importance of each item contained on the form.

If the test report form is not complete or does not reflect the required test data, the test report form may be returned to the certified backflow technician for correction.

The test report form must be completed as accurately as possible with all blanks being filled in where applicable and the certified backflow technician must place his signature, certification number and date of the test in a legible manner. The signature of the representative of the assembly owner on the "Certification of Final Performance" portion of the report form is critical so that the technician has documented evidence that the assembly owner or representative is aware of the final performance of the assembly. The backflow technician's signature is required to signify that the assembly has been tested in accordance with the standards.

Upon completion of the test report form, a copy of that report MUST go to:

1. The public drinking water supplier
2. The customer or owner of the device
3. The certified backflow technician

FAILURE TO SUBMIT THE REQUIRED COPIES TO ANY OF THE ABOVE LISTED PARTIES MAY RESULT IN REVOCATION OF THE TECHNICIANS CERTIFICATION.

These completed test report forms will be maintained as historical documentation within the files of the public drinking water system to reflect the viability of the cross connection control program. They will be subject to inspection by public health officials and/or the Division of Drinking Water to verify accuracy and competence in complying with the cross connection control program. The Division of Drinking Water requires that all backflow assembly test records, location forms, and high hazard air gap inspections be maintained for at least 5 years.

K. Assembly Location Report:

As many backflow prevention assemblies and devices have been installed without anyone being aware of their existence, a "Report of Location of a Backflow Prevention Assembly" form has been designed by the Division so that when these assemblies and devices are discovered, they can be reported to the water purveyor so that the public drinking water system may keep an inventory of the date, location and testing requirements of all backflow prevention assemblies.

Everyone is encouraged to report the location of any pressure vacuum breaker, spill-resistant vacuum breaker, double check valve, and reduced pressure principle assemblies as well as all high hazard air gaps. All location report forms should be submitted to the water purveyor.

VI. POLICIES

A. NON-INDUSTRIAL CONNECTION PROTECTION (APRIL 1987)
Revised January 1996

Due to the number of non-industrial connections within a public drinking water system and the logistical impossibility of requiring each connection to have hose bibb vacuum breakers on each hose bibb, atmospheric vacuum breakers, spill-resistant vacuum breakers or pressure vacuum breakers installed on all of their sprinkling systems and other points of cross connection, and due to the expense associated with these assemblies, a policy was written to help the public water system protect their distribution systems from possible non-industrial contamination.

Utah Code, Section 19-4-112(2) d, states, "There shall be no cross connections between the potable and non-potable water systems." This ban on cross connections serves as primary protection of the public drinking water system and therefore, Dual Check Valve Devices used at the meter yoke of a non-industrial connection will be considered secondary protection. Due to the proliferation of cross connections in the non-industrial areas including sprinkling systems supplied from non-potable sources and through the misuse of garden hoses, the installation of protective devices at the meter yoke is highly recommended as an added secondary protection to the drinking water system.

Those non-industrial connections serving buildings of three (3) stories or more (not to include basements) may not utilize a dual check valve device installed at the meter yoke as protection.

After review of manufacturers literature, design drawings and specifications, a dual check valve device (consisting of two independently operating spring loaded components) meeting or exceeding ASSE Standard 1024 contained within the meter yoke is recommended.

If these devices are installed in the meter yokes of non-industrial connections the owners or customer/consumer must be notified in writing that will explain (in non-technical terms) that this installation will create a "closed system" and that a "closed system" could result in a possible "thermal expansion" problem. The water system management must inform the customer adequately and to the point that the customer understands and assumes all responsibility to deal with this problem.

Dual check valve devices installed at the meter, within this policy, should be tested at the rate of 10% of the number installed within the system on an annual basis, by appropriate personnel on the water utility staff.

Any device installed to meet this policy must meet or exceed ANSI/ASSE Standard 1024, "Dual Check Valve Backflow Preventors."

A single in line or swing check valve installation cannot be considered adequate for backflow prevention.

B. RESIDENTIAL AND SMALL SPRINKLING SYSTEMS - NON-APPROVED INSTALLATIONS (APRIL 1989):
Revised January 1996

As referenced in Section VI, Policies Paragraph A, Non-Industrial Connection Protection, the logistical

problems encountered by public drinking water systems concerning residential and small sprinkling systems have made it virtually impossible to enforce the adopted Plumbing Code, wherein it states that; “The potable water supply to lawn irrigation systems shall be protected against backflow by an atmospheric-type vacuum breaker, a pressure-type vacuum breaker, a double check valve backflow preventer or a reduced pressure principle backflow preventer”.

Many lawn sprinkling system installers, as well as homeowners who have installed their own sprinkling systems, have been installing dual check valve devices in the supply line of the sprinkler system on the downstream side of the "stop and waste" valve, either in a vault or at times burying these devices and considered this as adequate protection. **THIS IS NOT TO BE DEEMED ADEQUATE PROTECTION AND IT IS AN ILLEGAL INSTALLATION.**

If a double check valve assembly is installed underground as backflow prevention on the sprinkling system, it must be placed in a vault with the minimum 12-inch clearance from floor ceiling and walls, to enable inspection, testing, and repair of that assembly. Otherwise, an atmospheric vacuum breaker or a pressure vacuum breaker must be installed at the proper location.

C. DUAL SOURCE SPRINKLING SYSTEMS (DECEMBER 1988):
Revised January 1996

Due to the ever increasing popularity of sprinkling systems (non-residential and residential) being fed by both non-potable pressurized irrigation systems and the public drinking water system, the following policy has been adopted within the Cross Connection Control Program of Utah:

Primary protection of the drinking water system used as backup to a non-potable pressurized irrigation system shall be through an approved air gap above a receptacle which would then utilize a booster pump to repressurize the water supply back into the sprinkling system; OR

A "swing connection" installed so that EITHER the pressurized irrigation system OR the drinking water system is feeding the sprinkling system (only one water supply can be connected at any time), AND a reduced pressure principle assembly (RP) must be installed on the drinking water system immediately upstream of the "swing connection", to protect the drinking water from any residual contamination from the irrigation water or the sprinkling water system from entering the drinking water system.

D. INSTALLATION OF NON-APPROVED ASSEMBLIES/DEVICES (OCTOBER 1985):

Should a backflow prevention device or assembly, which has not been approved be installed as the primary protection of the drinking water system, regardless of the degree of hazard, that unapproved assembly/device must be removed from service and replaced with an approved assembly/device that is listed on the current approved listing of the state.

E. LINE SIZING (APRIL 1989):

The installation criteria for each type of approved backflow prevention assembly and device has been specified in Section V Standards. Paragraph F Assembly Installation Criteria, and also in the adopted Plumbing Code. This installation criteria MUST be adhered to at all times.

In order to insure smooth flow characteristics entering and exiting any backflow prevention assembly or device, the following policy will be adhered to:
The installation of any approved backflow prevention assembly and/or device will be of equal size as the incoming pipe diameter (upstream) as the assembly or device and will also be equal to the outgoing pipe diameter (downstream).

Should this installation criteria be impossible to be adhered to because of line sizes, pipe types, construction, or demand flows, the following modification may be made:

1. The incoming pipe diameter (upstream) must be the same size (nominal size) as the backflow prevention assembly for a minimum of ten (10) pipe diameters upstream (in front of) the assembly or

device.

2. The outgoing pipe diameter (downstream) must be the same size (nominal size) as the assembly and/or device for a minimum of three (3) pipe diameters downstream (in back of) assembly or device.

Example: incoming (upstream) line size: 4" - backflow prevention assembly size: 2" - outgoing (downstream) line size: 4". The incoming line upstream must be reduced to a 2" line size a minimum of 20" (10 x 2") prior to the installation of the assembly, and the downstream line must be reduced to 2" for a distance of 6" (3 x 2") before it is up sized to the downstream line size of 4".

F. CONTAINMENT VS. ISOLATION TECHNIQUES (OCTOBER 1985):
Revised January 1996

The public drinking water system is charged with the responsibility of protecting the quality of the water it delivers to its consumers from the source of supply to the customers' meter or property line. Therefore, in consideration of a cross connection control program, the water purveyor should consider containment-meter protection as a minimum standard of protection for the public drinking water system. Isolation-plumbing code compliance allow protection to the last free flowing tap and is the recommended level of protection, but in many cases is beyond the jurisdiction of the public drinking water system.

CONTAINMENT-METER PROTECTION: Installing an approved backflow prevention assembly/device, commensurate to the highest degree of hazard found within the customers' water system, on the incoming service line prior to any other connections going to any other uses. This technique will protect the main distribution system from any contamination from the consumer/customer, however, this type of technique will not protect the people within the building or the private plumbing system from a cross connection or backflow incident within the customers own plumbing system.

ISOLATION-PLUMBING CODE COMPLIANCE: Installing an approved backflow prevention assembly/device commensurate to the degree of hazard at each point of cross connection within the customers' distribution system. This type of technique will involve more backflow prevention devices and assemblies. It will also require more involvement of the public drinking water officials, plumbing officials, and backflow technicians within the customers' water system so they may inspect for compliance at every point of cross connection, and to also ensure that each of the testable backflow prevention assemblies (RPs, DCs, PVBs, SVBs) are being tested within the annual guidelines (or more often as needed). This type of technique does, in fact, protect those within the customers' water system from any type of contamination as well as protecting the public drinking water system.

For compliance with the State program, containment methodology will be considered the minimum standard of protection. However, at the public water systems discretion both methodologies, containment and/or isolation may be used within the same facility as long as the minimum protection required by the adopted Plumbing Code is adhered to.

G. PRIVATELY-OWNED DRINKING WATER WELLS:

Privately-owned drinking water wells such as those serving a single family residence shall not be considered as non-potable (irrigation/secondary) water systems. However, since these wells have not been evaluated and approved for public drinking water sources, should the public water purveyor allow a connection between the two systems, the public drinking water system must be protected by the installation of an approved reduced pressure principle assembly (see section V Standards, Paragraph F, Assembly Installation Criteria).